

Lesson 5

Non-Linear equation = Equation whose graph does not form a straight line (linear) is called a Nonlinear Equation.

In a nonlinear equation, the variables are either of degree greater than 1 or less than 1, but never 1.

Examples of nonlinear equations

$$4x^2 + 2y - 1 = 0$$

$$x^3 + 2x^2 - 4xy - 1 = 0$$

$$x^{\frac{1}{3}} + y^{\frac{1}{3}}$$

Example 1: Which of the following equations is not a linear equation?

Choices:

A. $4x - 5 = \frac{1}{4}x$

B. $8 + x = 7$

C. $(x + 2)^2 = 6$

D. $x = 2$

Correct Answer: C

Solution:

Step 1: An algebraic equation is said to be linear if the variable or variables in the equation are of first degree.

Step 2: In the equation $(x + 2)^2 = 6$, x is raised to the power 2.

Step 3: So, $(x + 2)^2 = 6$ is **not a linear equation**.

Example 2:

X	1	2	3	4
Y	2	4	6	8

The table above represents a nonlinear function. Every y -value is the square of its corresponding x -value. The difference in output values is not constant. This table is an example of a quadratic function.

In a **linear** function, the output values have a difference, which is constant. The constant difference is equivalent to the slope of the line.

Linear equations are all equations that have the following form: $y = mx + b$.

M = slope and b = y-intercept

Example:

$$y = 2x + 5 \text{ with } m = 2 \text{ and } b = 5$$

$$y = -3x + 2 \text{ with } m = -3 \text{ and } b = 2$$

$$y = 4x - 1 \text{ with } a = 4 \text{ and } b = -1$$

Example: I am thinking of a number. If I add 2 to that number, I will get 5. What is the number?

Although it may be fairly easy to guess that the number is 3, you can model the situation above with an equation. Let x be the number in my mind.

Add 2 to x to get 5

Adding 2 to x to get 5 means that whatever x is, when I add 2 to x , it has to equal to 5

The equation is $2 + x = 5$